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College of Agriculture

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COST OF PRODUCING QUEEN AND PACKAGE BEES IN CALIFORNIA

by

R. L. Adams and Frank E. Todd

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Contribution from the
Giannini Foundation, University of California
and the United States Pacific States Bee Culture Laboratory

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(Not for Publication)

Introduction.-- The Pacific States Bee Culture Laboratory of the United States Department of Agriculture, with the cooperation of the College of Agriculture of the University, undertook, at the request of the Bee Breeders Association of California, a study of the cost of producing queen and package bees in California. The field work, following preparation of forms, was conducted during the month of October, 1933. Following record-taking, the various data were compiled into a composite cost table, indicating the costs, as built up from bee producers' statements. The result of this study comprises the presentation set forth in this text.

Number of Records.-- Usable records were collected from 22 producers of queen bees, this number including all but 4 of the total number of producers of queen bees operating during the 1933 season in California.

Records were likewise collected from 18 producers of package bees, this number of records representing about 90% of the total number of California producers of package bees operating during the 1933 season.

Method of Collecting Data.-- Following the formulating of a blank designed to give all required data, a visit was made to the various producers of queens and package bees, and full data collected by the question and answer method, the information being then duly recorded on the blanks provided for the purpose. Practically no producers were found to be keeping detailed records so that reliance upon estimates, based on their careful consideration of conditions, constitutes the basis for the various data presented and the deductions resulting therefrom.

Division of Labor.-- Messrs. Frank E. Todd and E. L. Sechrist, working jointly, collected all but three of the various records. These three were taken by Messrs. Todd and R. L. Adams.

The blank forms were drawn up by Mr. Frank E. Todd, reviewed by Mr. R. L. Adams and Mr. E. L. Sechrist, and mimeographed by the College of Agriculture of the University of California.

Office compilation of data was done by the Statistical Department of the Giannini Foundation of the College of Agriculture, University of California, under the direction of Miss Laura Toll.

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The final report was prepared by Frank E. Todd and R. L. Adams.

Basis of Calculating Costs.-- The basis of calculating costs of producing queens and package bees consisted of determinations of the following:

Production and Utilization:

Number produced during 1933 season, including purchases for resale.
Number (a) held for personal use, (b) sold or held for sale, and (c) number discarded.

Cost Items:

Interest on and depreciation of equipment.
Supplies (sugar, honey, cell cups, queen cages, purchased queens, bee cages, lath, lumber, wire, purchased package bees, postage, telegrams, stationery, advertising, etc.)
Current expenses (location rents, taxes, insurance, telephone, rent for bees, electric current, etc.)
Use of trucks and automobiles.
Labor -- operator's and hired

Average Cost:

Sum of cost items divided by number of queens or package bees produced.

Cost of Producing Queen Bees (California).-- The briefed findings arising from this study indicated the following basic facts and resulted in a composite cost as given in the tabular presentation below:

Output, 1933 season:

Produced:

Untested queens	63,882
Tested queens	142
Breeders (when sold as such)	8
	64,032

COST ITEMS:

Capital Items:

Kind	Number	Value based on first cost	Charge for depreciation
Breeder colonies	116	$ 1,191.00	$ 201.84
Cell builders	400	3,708.00	1,320.00
Mating nuclei	22,760	53,486.00	4,438.20
Bar frames	200	35.00	5.75
Impulse cages	4	10.00	1.67
Nursing cage	400	20.00	1.43

Capital Items (cont'd.)

Kind	Number	Value based on first cost	Charge for depreciation
Baby nuclei	400	$ 150.00	$ 75.00
Excluders	594	289.40	18.09
Cell protector	50	2.50	0.12
Starters	42	192.00	192.00
Feeders	1,033	238.58	21.69
Press	1	2.50	0.12
Incubators	2	250.00	16.67
Cage holder	10	2.50	0.21
Introducing cages	1,110	276.00	30.00
Heating equipment	7	100.50	8.38
Houses, special	4	91.50	11.44
Transfer instruments	27	15.50	1.94
Cell cup apparatus	--	91.50	--

Total investment (capital items)	$60,393.98
Interest on average capital items at 6%	1,811.82
Charge to cover depreciation	6,689.55

(Assumed that labor charge covers whatever repairs to equipment are required.)

Supplies:

Kind	Amount	Value
Sugar (feed)	4,185 lbs.	$201.40
Honey (feed)	29,570 lbs.	797.60
Cell cups	86,300 (#)	135.40
Queen cages	46,558 (#)	1,117.39
Postage on queens	44,540	472.12
Powdered sugar	2,288	155.00
Labels, cages	7,000	17.50
Invert sugar syrup		134.86
Misc. supplies		75.00
	Total	$3,105.77

Chargeable:

to production --	$1,209.40
to marketing --	1,896.37
	$3,105.77

Current Expenses:

Location rents	$292.30
Taxes	199.00
Insurance	70.00
Telephone	78.50
Electric current	6.75
Rent of buildings	145.00

Current Expenses (cont'd.)

Miscellaneous	$215.63
Total	$1,007.18

Use of trucks and automobiles:

	Trucks	Automobiles
Number reported	23	11
Mileage chargeable to queens	43,025	22,460 miles
Weighted average cost per mile	5.6¢	7.7¢
Amount chargeable	$ 2,404	1,806*

* Included $82 rentals paid.

Labor:

	Operator's	Family other than operator	Hired
Total hours	17,570	4,877	8,172
Rate per hour (weighted average)	44.6¢	28.8¢	26.9¢
Total charge	$7,939.45	$1,421.50	$2,196.12

TOTAL CHARGE FOR LABOR $11,557.07

Joint Costs:

(Note: The following items are costs jointly assignable to both queens and package bees, the total being finally assigned equally to each group.)

Item	Amount
Postage and telegrams	$478.00
Stationery	28.00
Advertising	1,252.00
Miscellaneous	35.00
Total	$1,793.00
Amount assigned to queens	896.50

Cost of Producing Package Bees (California):-- Basic facts and the composite cost of producing package bees are tabulated below:

Output (1933 season) based on sales:

Produced	
Total pounds of bees	53,749 pounds
Purchased (for resale)	2,280 pounds
TOTAL (produced and purchased for resale)	56,029 pounds

COST ITEMS:

Colony Expense:

Equipment Charge: This charge was determined as follows:

Item	Number	Value	Charge for depreciation
2-story, 10-frame hives, complete	12,980	$67,496	$5,841.00
Bees, queens, and brood	12,980	59,318	4,633.80

Chargeable 73% to honey production and 27% to package bees, thus:

Charge for use of equipment and bees (capital $31,940) @ 6% on average investment: Interest	958.20
Charge to cover depreciation of equipment	1,577.07
Charge to cover depreciation of bees and queens	1,251.13

Supplies: 215,000 pounds of honey @ 3¢: $6,450.00

Labor: 5,192 hours @ 53.9¢, total $2,855.60, of which 27% is chargeable to packaged bees: $771.01

Collecting and Marketing Packaged Bees:

Capital invested in marketing items:

Items	Number	Value	Charge to cover depreciation
Sealing machine	4	$ 66.00	$ 7.10
Package bee cages (return)	2,200	361.00	180.50
Screen house	1	5.00	0.83
Scales	21	297.00	19.80
Funnels	30	57.55	5.23
Miscellaneous	18	44.00	7.86
Totals		$830.55	$221.32

Interest on average capital @ 6% on $830.55:	$ 24.95
Depreciation of capital items:	$221.32

Supplies for Packaged Bees (21,491 packages):

Kind	Amount	Value
Sugar	18,880 pounds	$ 786.95
Cages (complete)	21,491 numbers	2,471.47
Lath		186.00
Baling wire		28.00
Miscellaneous		21.05
Total		$3,493.47

Package bees purchased for resale:

2,280 pounds $ 479.75

Queens (at cost of production; as shown above) -- complete with cages but less postage:
21,807 number @ 46½¢ $10,140.25

Current Expenses:

Location rents (allocated to package bees)	$ 294.30
Taxes	276.00
Insurance	93.00
Telephone	26.50
Electric current	33.75
Rent of buildings	55.00
Miscellaneous	225.63
Total	$1,004.18

Charge for Trucks and Automobiles:

	Trucks	Automobiles
Number reported	19	4
Mileage chargeable to package bees	44,841 miles	6,775 miles
Weighted average cost per mile	8¢	5.5¢
Amount chargeable	$3,581.00	$354 *

* Includes $12 paid in rents.

Labor:

	Operator's	Family other than operator	Hired
Total hours	4,712	1,302	11,636
Rate per hour (weighted average)	53.9¢	30.8¢	26.4¢
Total charge	$2,534.90	$ 400.00	$3,064.57

TOTAL CHARGE FOR LABOR $5,999.47

Joint Costs:

(Note: The following cost items are jointly assignable to both package bees and queens, the total being finally assigned to each group equally.)

Item	Amount
Postage and telegrams	$478.00
Stationery	28.00
Advertising	1,252.00
Miscellaneous	35.00
Total	$1,793.00
Amount assigned to package bees:	$ 896.50

Recapitulation:

Total pounds of package bees	56,029 pounds
Production and marketing costs:	
Interest on colony equipment, including bees, queens, and brood; prorated amount to package bees	$ 958.20
Depreciation of colony equipment, prorated amount to package bees	1,577.07
Depreciation of colony bees; prorated amount to package bees	1,251.12
Labor on colonies; prorated amount to package bees	771.01
Honey (used to produce bees)	6,450.00
Interest on capital items used in collecting and marketing package bees	24.95
Depreciation of capital items used in collecting and marketing package bees	221.32
Current expenses	1,004.18
Purchase of bees for resale	479.75
Charge for use of trucks and automobiles	3,935.00
Labor in shaking and packaging bees, making cages, etc.	5,999.47

Production and marketing costs (cont'd.)

Share of joint costs	896.50
Total cost (not including queens or packages)	$23,568.57
Cost per pound (not including queens or packages)	42.1¢

Cost of packages (other than labor -- included above) $3,493.47 or 16.2¢ each.

Cost of queens: $10,140.25 or 46½¢ per package

Total Costs per Package:

2-pound package; no queen	$1.00
2-pound package with queen	1.47
3-pound package; no queen	1.43
3-pound package with queen	1.90

Actual Sales Reported:

	Number	Pounds Bees
2-pound packages	8,445	16,890
3-pound packages	12,782	38,346
Miscellaneous sizes	--	793
Total		56,029

Comments.-- The cost of producing queens and package bees, as set forth above, represents average costs. Later, when time permits, the authors plan a more detailed study of the various records, to determine the range in costs by individual producers, together with analyses designed to show variations in cost items, and possibly suggestions that can be utilized by beekeepers in the conduct of their business. In the meantime, however, one should bear in mind that an average cost does not necessarily set the price that producers should receive if they are to continue in business for the reason that the demands for queens and package bees may be such that if a price were set merely at the average, producers operating at costs above the average might be forced out of business with a corresponding reduction of available queens and package bees. It is the authors' opinion that a price to maintain production to the required maximum must be set above the average but at what figure only an intensive study of the individual records will determine. Only such a study will give the "bulk line cost" necessary to bring forth the required numbers of queens and package bees. If time permitted, this information would have been submitted as it has a very evident and definite bearing upon the whole problem of what prices should be set in order to insure sufficient supplies to take care of all market demands.

The costs presented above do not provide for interest other than on equipment; thus interest (to cover use of capital in addition to equipment) and any sum to represent profits are to be added in a final determination of a selling price.

Appendix A

QUEEN AND PACKAGE BEE PRODUCTION COST SURVEY

METHODS OF PRODUCTION

1. Queen production season _____, 1933 to _____, 1933. Normal _____
2. Average dates: first queen _____; first orders _____
   last queens _____; last orders _____
3. Date bees were returned to honey production _____ How much crop loss ____
4. Breeding stock: number _____; origin _____.
5. How do you care for breeding colony _____

Item	Cell building colony	Nuclei
Number used		
How prepared		
How fed		
How is bee strength maintained		
Cell removed in no. days, etc.		
Queens removed; when and how, etc.		
When are new cells added		
No. inspections per batch (reason)		
No. handlings each queen and purpose		

7. Cell cup preparation method _____
8. Method of starting cells _____
9. Grafting method: Dry _____; Royal jelly; pure _____, diluted _____
10. How is drone supply provided _____
11. No. cells per batch _____; No. queens per nuclei per season _____
    Percentage cells completed ____%; acceptance in nuclei: Queens ____%; ripe cells ____%
    Percentage of good queens per batch _____%. Normal percentage _____%

PACKAGE BEES

1. Season _____, 1933 to _____, 1933. Normal season _____
2. Number colonies supplying pkgs. _____. Do you buy bees ____. Ave. lbs. per col ____
3. Percentage honey crop lost by sale pkg. bees _____%.
4. How long have you shipped: Pkg. bees _____ yrs. Queens _____ yrs.
5. Do you exclude drones _____ How much overweight _____ Extra queens _____

SHIPMENTS

Year	Queens	Queen prices		Package bee prices					
		1 to	Over	Pkg. bees	2 lbs.	With queen	3 lbs.	With queen	Others
1933		¢	¢						
1932									
1931									
1930									
1929									
1928									
1927									
1926									
1925									
1924									

PRODUCTION RECORD 1933

Item	Produced	Number purchased	Total	No. sold	Ave. unit price	Gross receipts
Untested queens						
Tested queens						
Breeders						
Used at home						
Held for sale						
Unsold - discarded						
Package bees, 2 lbs.						
2 lbs. with queen						
Package bees 3 lbs.						
3 lbs. with queen						
Orchard packages						
Other sizes						

No. queen replaced on buyers demand, 1933 _____. Expense _____.
Bad collections. Queens: No. _____; Amount _____.
Number package bee claims, 1933 _____; Replaced pkgs. _____ Expense _____
Bad collections: pkg. bees; No. _____. Amount _____ Express refunds _____
Is above usual situation? Claims _____, queens sold _____ Pkg. bees sold _____

INVENTORY OF SPECIAL EQUIPMENT

1. Total no. colonies operated _____; No. used in queen prod. _____; Pkg. bee prod. _____.

Item	No.	Unit price	Total value	Age	Remaining life	
Breeder colonies						
Full colonies						
Cell builders						
Mating nuclei						
Excluders						
Feeders						
Incubators						
Cell cup apparatus						
Introducing cages						
Heating equipment						
Transferring inst.						
Cell protectors						
Houses (special)						
Breeder queens						
Funnels						
Pkg. bee cages (returnable)						

LABOR RECORD

	Item	Month	Crew	Operator and family					Hired help				
				Days	Hrs.	Total	Rate	Amt.	Days	Hrs.	Total	Rate	Amt.
QUEENS	Prep. queen cells												
	Prep. nuclei												
	Caring for colonies												
	Prep. cells												
	Transfer. larvae												
	Introducing cells												
	Caging queens												
	Preparing feed												
	Feeding												
	Preparing candy												
	Mailing queens												
	Office work												
	Inspections												
PACKAGE BEES	Shaking bees												
	and shipping												
	Preparing cages												
	Preparing feeders												
	Preparing syrup												

Time of operator against queens _____ days; Package bees _____ days
Time of family against queens _____ days; Package bees _____ days
Time of hired help against queens _____ days; Package bees _____ days

Normal wage: Operator _____; Family _____; Hired help _____.

SUPPLIES

	Item	1st inventory			Purchased			Used			On hand		
		No.	Unit price	Total value	No.	Unit price	Total value	No.	Unit price	Total value	No.	Unit price	Total value
QUEEN PRODUCTION	Sugar (feed)												
	Honey (feed)												
	Cell cups												
	Queen cages												
	Postage on queens												
	Queens purchased												
PACKAGE BEES	Sugar (pkg. bee feed)												
	Bee cages (complete)												
	Lath												
	Lumber												
	Wire(baling)												
	Package bees purch.												
JOINT	Postage & telegraph												
	Stationery												
	Advertising:												
	Magazine												
	Circular letter												
	Personal												

CURRENT EXPENSES

Item	Queens		Package bees	
		Total		Total
Locations				
Taxes				
Insurance				
Telephone				
Interest (BWC)				
Rent for bees				
Electric current				

TRUCK AND AUTO EXPENSE

	Truck	Auto
Make		
Size		
Mileage traveled, 1933		
" % to bees		
" % to queen		
" % to package bees		
Average miles per year		

MILEAGE

Item	Miles	No. trips	Total miles	Truck	Auto
Round trip to queen yard					
Post office trips					
Express Co. trips					
Trips to obtain package bees					

Appendix B. Past Prices Received from Sale of Queens

	Singles	Lot sales
1933	35¢ - 65¢	28¢ - 65¢
1932	60 - 85	32 - 75
1931	60 -$1.00	40 - 75
1930	60 - 1.25	50 -$1.00
1929	75 - 1.25	50 - 1.00
1928	75 - 1.25	50 - 1.00
1927	75 - 1.25	60 - 1.00
1926	75 - 1.25	90 - 1.00
1925	75 - 1.25	90 - 1.00

Appendix C. Past Prices Received from Sale of Package Bees (with queen)

	2-lb. pkg.	3-lb. pkg.
1933	$1.20 - 1.80	$1.60 - 2.50
1932	1.20 - 1.85	1.60 - 3.30
1931	1.20 - 2.50	1.60 - 3.90
1930	1.20 - 3.00	1.60 - 3.50
1929	2.25 - 2.50	2.50 - 3.50
1928	2.25 - 2.60	3.00 - 3.25

The total shipments of California queens and package bees, 1933, were as follows:

	Queens	Package bees	
	number	pounds	packages
Commercial sales	49,316	67,029	25,890
Shipments to enterprises located in other states by California branch of same	2,890	8,675	3,470
	52,206	75,704	29,360